



Quick Facts

Frankfort's System has:

- ⇒ 5,944 manholes
- ⇒ 248.6 miles of sewer mains
- ⇒ 222.5 miles of gravity mains
- ⇒ 26.1 miles of force mains
- ⇒ 20 miles of combined sewer
- ⇒ 49 pump stations

A Glossary of Abbreviations and Terms can be found on page 7. All underlined Abbreviations and Terms can be found in the Glossary.

City of Frankfort, Kentucky

Sewer Department Overview

History

The primary Waste Water Treatment Plant (WWTP) was built in 1955 along with the Combined Sewer Interceptor that collects storm and waste water in the same system. It generally parallels the Kentucky River and intercepts all combined sewers near their point of discharge. At the time of construction all sewage from east and west Frankfort, Glens Creek and Fort Boone flowed through this combination sewer.



Lab at the Sewer Department

In 1972 the City requested a grant under PL 92-500 (commonly called the "Clean Water Act") to expand the WWTP and construct major trunk sewers.

Construction began in 1978 on a new 4.3 Million Gallon per Day (MGD) WWTP with Ozone disinfection. The new plant went on line April 21, 1980.

In 1990 the WWTP was expanded to 6.6 MGD at no cost to the City by recalculating the plant's design loadings. In 2001 the plant was again expanded to 9.9 MGD, with the construction of a third oxidation ditch and associated facilities.

The Plant was originally constructed using Anaerobic digestion. Anaerobic digestion is a process where microorganisms break down organic materials such as food scraps, manure, and sewage sludge in the absence of oxygen. This process reduces the waste to sludge and other bio-solids. In 1994 the covers of the anaerobic digesters were removed and aerators were installed to convert from an anaerobic digestion process to an aerobic digestion process.

Enforcement Actions

According to the EPA the City allegedly violated provisions of the Clean Water Act by having multiple reoccurring Sanitary Sewer Overflow occurrences which impacted the Kentucky River and its tributaries. Additionally, EPA contended that the City had not complied with its Combined Sewer Overflow Control Policy which required development of a Long Term Control Plan to mitigate the Combined Sewer Overflows. As a result a Consent Judgment between the City and the Commonwealth of Kentucky Environmental and Public Protection Cabinet was entered into the Franklin County Circuit Court on September 5, 2007. (NOTE: The Environmental and Public Protection Cabinet is now the Energy and Environment Cabinet)

On June 23, 2008 the City received an Administrative Order (AO) from EPA's Region IV that required the City to submit certain documents and reports required by the Consent

(Enforcement Actions Continued)

Judgment for comment and approval.

The Administrative Order issued by EPA on June 23, 2008 directs all CSOs, be mitigated by June 23, 2018 – 10 years after the date of the Administrative Order. A letter has been submitted to the EPA requesting the deadline for CSO mitigation be extended to match the dates in the Consent Judgment.



Requirements for the Enforcement Actions

All Sanitary Sewer Overflows (SSOs) shall be eliminated by September, 2015 – 8 years after the Consent Judgment was signed.

All Combined Sewer Overflows (CSOs) shall be mitigated by December 31, 2023.

Accomplishments

The Department has met many of the requirements over the past several years as summarized below. An Early Action Plan was submitted as required. It included the following:

Nine minimum goals were submitted by September 2008.

1. Proper operation and regular maintenance programs for the Combined Sewer System (CSS) and the Combined Sewer Overflows (CSOs);
2. Maximum use of the collections system for storage;
3. Review and modification of pretreatment requirements to assure CSO impacts are minimized;
4. Maximization of flow to the Wastewater Treatment Plant (WWTP) for treatment
5. Prohibition of CSOs during dry weather, including provision for backup power where appropriate;
6. Control of solid and floatable materials, including installation of devices where appropriate;
7. Pollution prevention;
8. Public notification to ensure the public receives adequate notification of CSO occurrences and CSO impacts, including, if appropriate, improving the current signage at each CSO location to an easily readable type size and style; and
9. Monitoring to effectively characterize CSO impacts and efficacy of CSO controls.

Capital Improvements Project List was submitted. (See Back Pages)

Capacity Management Operations and Maintenance (CMOM) – responded to comments in April, 2014 and are currently awaiting approval.

Sewer Overflow Response Protocol (SORP) approved May 2010.

Additional Accomplishments

- ♦ Sewer Use Ordinance was approved by the Division of Water in April, 2008.
- ♦ Mapping of the System was submitted to Kentucky Division of Enforcement and EPA in October, 2009.
- ♦ A Long Term Control Plan was submitted in June, 2009 and the Sewer Department responded to comments in September, 2014 and is currently awaiting approval.
- ♦ An Interim Long Term Control Plan (ILTCP) was approved in April, 2011.



Collections

The Collections Division includes 248 miles of sewer mains, 20 of which are combined sewer lines while the remaining 228 are separate sanitary sewer lines. These lines include gravity sanitary sewer lines, gravity combined sewer lines and force mains. The overall system also includes 5,944 manholes, 49 pump stations and 284 individual pump stations which are part of low pressure systems.

The Sewer Department's Collections Division has four maintenance crews that are cross-trained in order to handle workloads when employees are on vacation or sick.

Rod Crew – The Rod Crew has two employees who respond to blockage or sewer backup calls. The crew uses mechanical rods or augers inserted into the main to remove blockages.

Jetting Crew – The Jetting Crew has two employees who use a jet machine to pump water into the main and flush the system with up to 28 pounds of pressure.

Locator Crew – The Locator Crew has one employee who locates mains for emergencies as well as 811 inquiries.

Camera Crews – The Collections Divisions has two Camera Crews with two employees for each crew. There is one crew for mains and one crew for lateral lines. These crews respond to emergency calls as well as routinely using cameras to look for issues in the lines and give insight on how to prevent future problems.

The Collections Division also has a four member Construction Crew that responds to all emergency digs, small in-house projects and assists contractors. This crew also monitors all telemetering sensors in the collection system indicating overflows and occasionally are in the field after a heavy rain to monitor flood prone areas. The Construction Crew faces challenges due to the many types of sewer mains including concrete, clay, PVC, Orangeburg, HDPE and asbestos. Special fittings are often needed to connect different materials.

Combined Sewers

The City of Frankfort has approximately 20 miles of Combined Sewers. A Combined Sewer is a system that collects sanitary sewage and stormwater runoff in a single pipe. When these mains were installed most municipalities used single-pipe or combined systems that collected both sewage and runoff from streets and roofs. The rationale for combining the two was that it was cheaper to build a single system. Most cities did not have sewage treatment plants and the sewer system discharged directly into streams or rivers. Combined Sewers can cause serious water pollution problems due to sewer overflows which are caused by large variations in flow between dry and wet weather. As populations grew and regulations tightened the installation of Combined Sewers ceased. However, Frankfort, as well as many older cities, still have Combined Sewers in their systems.

Separate Sanitary Sewers

The City of Frankfort has approximately 240 miles of separate sanitary sewers. Separate sanitary sewers are designed to convey only sewage from homes and businesses to a treatment facility.

Maintenance

The Sewer Department has a Maintenance Division with 10 employees. Eight employees focus on mechanical maintenance issues and two are electricians who focus on electrical issues. The Maintenance Division handles routine and emergency items at the treatment plant, the 49 pump stations and 284 E-I pump stations located in individual homes or businesses. These employees also maintain the six flood pumps for Public Works, assists with Corp of Engineers inspections and is available during flood events for routine maintenance.

Plant Overview



Once wastewater is collected through laterals and main lines it enters the plant for treatment which has five operators and runs 24/7. The water and sewage is routed through a number of systems to remove large objects such as debris, bottles and boards. Wastewater then enters a grit removal system utilizing a forced vortex process that removes most of the sand and other smaller debris from the organics and the waste stream. Most of the silt and debris comes from the Combined Sewers.

Wastewater then goes through biological treatment in three oxidation ditches where the wastewater is treated utilizing an activated sludge process to remove biodegradable organics. After the wastewater has circulated through the oxidation ditches, it flows to four clarifiers where solids settle to the bottom and clear wastewater leaves the clarifiers over a set of V-notched weirs.

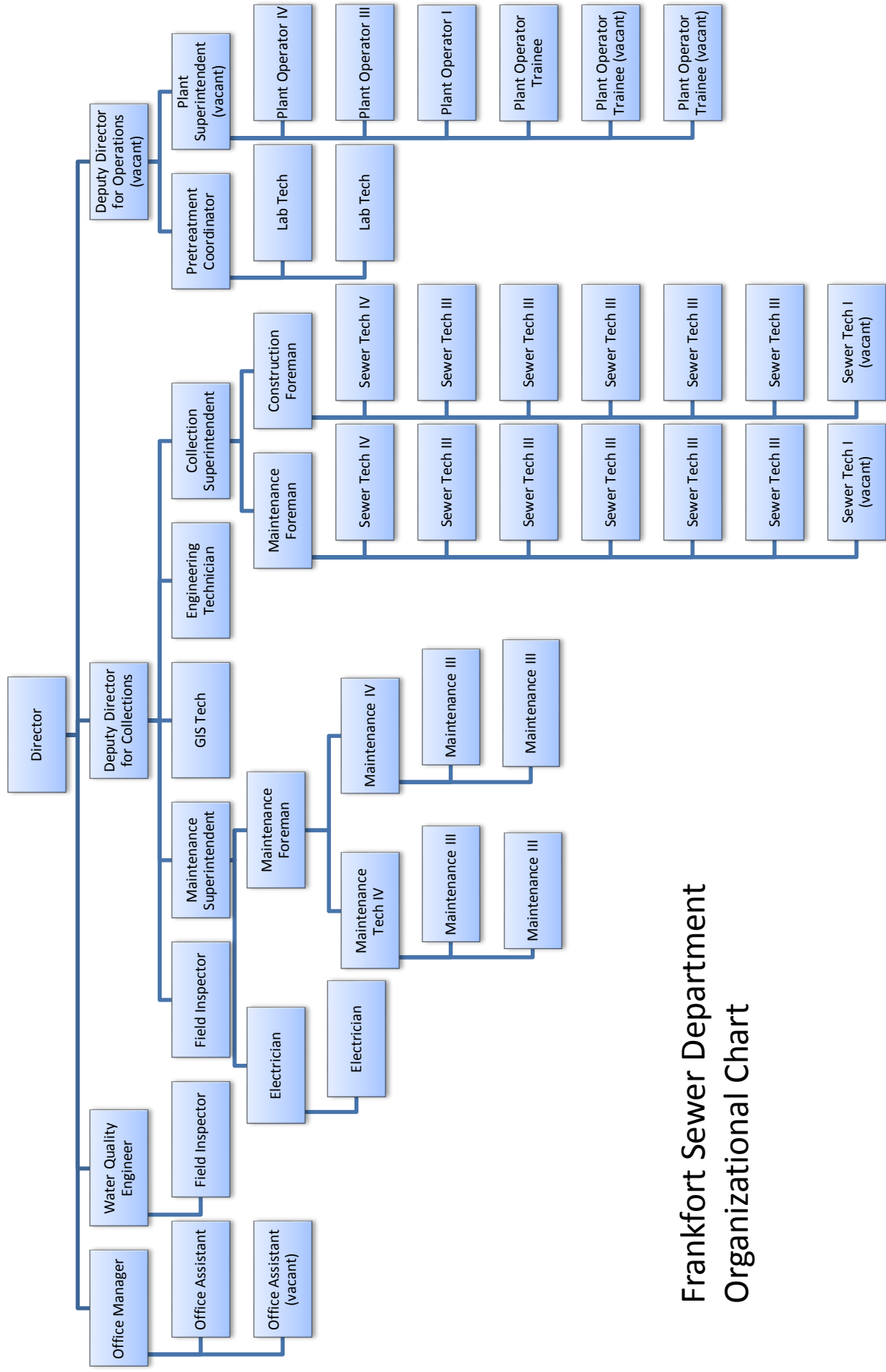
After wastewater leaves the clarifiers it is directed to the ozone contact chamber where ozone circulates through the wastewater killing pathogens and disinfecting the wastewater

Solids that settle to the bottom of the clarifier, also called sludge or bio-solids, are then partially digested and sent to the landfill for disposal or fully digested and land-farmed on a permitted farm. The Plant also has a lab where three staff members run a pre-treatment program, conduct tests and regulates industries in Franklin County by collecting and testing samples.





Frankfort Wastewater Treatment Plant



Frankfort Sewer Department
Organizational Chart

Glossary of Abbreviations and Terms

Glossary of Abbreviations and Terms

AO—Administrative Order

CAD - Computer-assisted design

CAP - Corrective Action Plan

CCTV - Closed circuit television

CFR - Code of Federal Regulation

CJ - Consent Judgment

CSO - Combined Sewer Overflow

CWA - Clean Water Act

DEP - Department of Environmental Protection

DOW – Division of Water

EEC—Energy and Environment Cabinet

EPA - Environmental Protection Agency

EPCC—Environmental and Public Protection Cabinet (now EEC)

ESRI - Environmental Systems Research Institute

GIS - Geographic Information System

GPS - Global positioning system

I/I - Inflow and infiltration

KPDES – Kentucky Pollutant Discharge Elimination System

LTCP - Long-term Control Plan

NPDES - National Pollutant Discharge Elimination System (permitting program)

SSO - Sanitary Sewer Overflow

Glossary

811—Know What's Below , number to call before digging for construction.

Activated Sludge – Solids separated during the treatment of wastewater. (see bio-solids)

Aerobic Digestion— The natural biological degradation and purification

of waste in which bacteria that thrive in oxygen rich environments break down and digest the waste.

Anaerobic Digestion – Anaerobic digestion is a process when microorganisms break down organic materials, such as food scraps, manure, and sewage sludge, in the absence of oxygen.

Bio-solids – Sludge which has received further treatment in the system.

CMOM (Capacity, Management, Operation & Maintenance) - Also known as the SSO Rule, this proposed regulation sets stringent guidelines for the capacity, management, operation and maintenance of municipal sanitary sewer collection systems.

CSO Policy - Sets short (nine minimum controls) and long-term (long-term control plan) requirements for municipal combined sewer collection systems.

Cleanout - An opening which allows for removing any debris or obstruction that might block the flow of wastewater.

Clean Water Act - A 1977 amendment to the Federal Water Pollution Control Act of 1972, which set the basic structure for regulating discharges of pollutants to waters of the United States. The Act, enforced by the Environmental Protection Agency, prohibits any sanitary sewer overflows and requires that combined sewer overflows be controlled to three or four annually.

Combined Sewer Overflows (CSOs) - When a combined sewer is too full of rainwater and sewage, untreated sewage is discharged through design structures. This is designed to occur during wet weather, but can also occur due to poor operation and maintenance. Overflows also can occur through overflowing manholes or basement backups.

Combined Sewer System - A system that is designed to carry both stormwater and sewage in the same pipe. Combined sewer system communities are regulated by the CSO Policy (Nine minimum controls).

E-I Pump Stations -The E/One Sewer system is a pressure sewer system that is powered by E/One grinder pumps. A pressure sewer system uses small-diameter pipes and grinder pumps, which are often installed at each home. The grinder pump station collects all of the wastewater from the home and grinds it into slurry. The wastewater is then pumped to a larger sewer main or directly to a wastewater treatment plant.

Force Main Line – A principle line in which wastewater is pumped as opposed to gravity.

Forced Vortex Process – This process uses centrifugal force to separate solids from wastewater.

Gravity Line – A principle line in which wastewater flows by gravity.

Jet Machine – High powered pulsation machine designed to propel water through pipes to clean pipes.

Lateral Line- The pipe that conveys sewage from private property to the public sewer system connection

Main Line- The large public pipe that conveys sewage sewer plant.

Pump Station – A station equipped with one or more pumps that is designed to move raw sewage, fed from gravity lines into an underground tank or wet well, to a sewage treatment plant.

Sanitary Sewer Overflows (SSOs) - When a sanitary sewer is too full of sewage, untreated sewage is discharged through design structures.

Telemetry Sensors - Sensors that monitor and alert when there are changes to the sewer system flow.

Frankfort Sewer Department Consent Judgment Projects

Below are collection system improvements that have been completed or are in process since 2007 per the consent judgment.

Completed Projects

| PROJECT # | PROJECT NAME | COST | STATUS |
|-----------|----------------------------------|---------------|----------|
| 68002 | East Frankfort PS and Force Main | \$ 6,000,000 | Complete |
| 68019 | Westover SEP Project | \$ 550,000 | Complete |
| 68024 | Winding Way | \$ 45,000 | Complete |
| 68030 | East Main Line Rehab | \$ 970,000 | Complete |
| 68032 | Cardinal Hills Line Rehab | \$ 375,000 | Complete |
| 68033 | Myrtle Ave Phase 2 Line Rehab | \$ 1,380,000 | Complete |
| 68034 | Two Creeks I & I Reduction | \$ 900,000 | Complete |
| 68037 | Holmes Street Contract III A-2 | \$ 1,700,000 | Complete |
| 68040 | West Main Line Rehab | \$ 323,000 | Complete |
| 68043 | Ridgeview PS Replacement | \$ 975,000 | Complete |
| 68047 | Willow Street PS Controls | \$ 57,000 | Complete |
| 68048 | Mero Street PS Controls | \$ 47,000 | Complete |
| 68049 | Oxidation Ditch 1 & 2 Rehab | \$ 710,000 | Complete |
| 68062 | National Guard PS Replacement | \$ 1,800,000 | Complete |
| 68068 | Upper Slickway Capacity Upgrade | \$ 1,700,000 | Complete |
| 68070 | Jim Beam PS | \$ 2,200,000 | Complete |
| 68073 | Twilight Trail PS | \$ 18,800 | Complete |
| 68074 | Silver Lake PS Replacement | \$ 29,000 | Complete |
| 68087 | East Frankfort Interceptor | \$ 1,125,000 | Complete |
| 68100 | WWTP Grit System Modification | \$ 108,000 | Complete |
| 68102 | Marlowe Court Sewer Upgrade | \$ 205,000 | Complete |
| 68109 | Holmes Street Contract C-1 | \$ 565,000 | Complete |
| 68111 | River Spur | \$ 150,000 | Complete |
| | Total | \$ 21,932,800 | |

Projects In-Process

| PROJECT # | PROJECT NAME | COST | STATUS |
|-----------|---------------------------------|---------------|--------------------|
| 68004 | Two Creeks PS Replacement | \$ 600,000 | Under Construction |
| 68012 | Fort Boone PS Replacement | \$ 88,000 | In Design |
| 68020 | 98 Wilkinson Blvd | \$ 75,000 | On Hold |
| 68031 | Indian Hills Line Rehab | \$ 640,000 | Under Construction |
| 68036 | West Frankfort PS Replacement | \$ 42,000 | In Design |
| 68039 | Kentucky Avenue Interceptor | \$ 276,000 | In Design |
| 68044 | Prevention Park PS Replacement | \$ 25,000 | In Design |
| 68045 | Capital Avenue PS Overhaul | \$ 350,000 | Under Construction |
| 68046 | Buena Vista PS Replacement | \$ 5,000 | Evaluation |
| 68060 | Bon Air PS Replacement | \$ 110,000 | Under Construction |
| 68061 | Miami Trail PS Replacement | \$ 20,000 | In Design |
| 68078 | Willowcrest I & I Reduction | \$ 540,000 | Under Construction |
| 68082 | Crestwood I & I Reduction | \$ 615,000 | Under Construction |
| 68082-A | Crestwood Stormwater | \$ 16,000 | Under Construction |
| 68083 | Tierra Linda I & I Reduction | \$ 331,000 | Under Construction |
| 68084 | Forest Villas Siphon | \$ 50,000 | Under Construction |
| 68085 | Wet Weather Detention Facility | \$ 7,425,000 | Under Construction |
| 68093 | WWTP Vactor Dump Pit | \$ 27,000 | Under Construction |
| 68096 | Country Lane I & I Reduction | \$ 150,000 | Under Construction |
| 68097 | Holly Hills I & I Reduction | \$ 170,000 | In Design |
| 68103 | Thornhill Interceptor | \$ 95,000 | In Design |
| 68104 | Home Deport PS Replacement | \$ 32,000 | In Design |
| 68105 | Poplar Creek PS Replacement | \$ 22,000 | In Design |
| 68106 | Old Lawrenceburg FM | \$ 3,000 | In Design |
| 68110 | Cline Street Rehab | \$ 3,500 | In Design |
| 68112 | Benson CSO # 12 Elimination | \$ 155,000 | In Design |
| 68114 | 2nd Street at Logan - Floodwall | \$ 55,000 | In Design |
| 68115 | Capital Avenue PS Roof Replace | \$ 8,000 | Under Construction |
| 68116 | 128 - 135 Winding Way | \$ 125,000 | Under Construction |
| 68120 | Myrtle Ave Phase 1 Line Rehab | \$ 28,000 | In Design |
| | Total | \$ 12,081,500 | |